



# Sustainable agricultural practices in Armenia

---

## Desk Study

conducted by the NGO Armenian Women for Health and Healthy Environment (AWHHE) with support from Global Greengrants Fund (GGF).

September 2025

## **Introduction**

This desk study was conducted by the NGO Armenian Women for Health and Healthy Environment (AWHHE) with the financial support from Global Greengrants Fund (GGF).

The objective of this desk study is to identify and promote the current evidence of use of non-chemical alternatives for sustainable agricultural practice.

Agriculture is one of the key contributors to the Armenian economy and the main source of employment. Alternative agriculture in Armenia is primarily represented by organic farming, which has been actively developing since the early 2000s and was legally enshrined in 2008. In addition, other areas are developing in the country, such as modern greenhouse farming, livestock farming, intensive horticulture, fish farming, and viticulture and winemaking. The aim is to create sustainable, innovative, and highly profitable agriculture that is harmonious with the environment.

The desk study identifies and summarizes best practices that Armenia's small-holder farmers are implementing in order to reduce the use of pesticides, especially the Highly Hazardous Pesticides (HHPs) and thus contribute to climate change adaptation in the rural communities.

The desk study also presents cases of good practices in Armenia's provinces of Kotayk and Lori.

## Contents

List of Abbreviations .....	3
Executive Summary.....	4
Armenia: a brief overview.....	5
Sustainable Land Use Practices in Armenia .....	8
1. Soil and Crop Management Systems.....	8
2. Low External Input Sustainable Agriculture .....	10
3. Integrated Pest Management and Organic farming.....	11
4. On-farm Water Efficient Systems.....	15
Renewable energy integration in agriculture.....	18
Recommendations .....	20

## List of Abbreviations

AMD	Armenian Dram
ATG	Armenian Technology Group
AWHHE	Armenian Women for Health and Healthy Environment
CA	Conservation Agriculture
FAO	Food and Agriculture Organization
GAP	Good Agricultural Practices
IPM	Integrated Pest Management
LEISA	Low External Input Sustainable Agriculture
HHP	Highly Hazardous Pesticide
LLC	Limited liability company
NGO	Non-governmental organization
PERSUAP	Pesticide Evaluation Report and Safe Use Action Plan
RA	Republic of Armenia
RED-NEO	Rural Economic Development-New Economic Opportunities
UN	United Nations
WoLeRE	Women Leading Rural Entrepreneurship in Armenia

# Executive Summary

The objective of this desk study is to identify and promote the current evidence of use of non-chemical alternatives for sustainable agricultural practice. The study covers the following areas:

- Brief background on Armenia
- Overview of the status of sustainable agriculture practices in Armenia
- National policies for reduction of pesticide use and promotion of sustainable agriculture (integrated pest management (IPM), crop rotation and diversification, soil health management, water conservation, agroforestry, organic farming, and the use of renewable energy.
- Case study of best farming practices in Kotayk, Lori and xx provinces of Armenia.

## **Methodology**

To complete this study a variety of printed and online material was reviewed. The following information sources were used:

- The Government (<http://www.gov.am/en/>) of the Republic of Armenia (RA) including the Ministry of Economy (<https://www.mineconomy.am/en>) and the Ministry of Environment (<http://env.am/en>), Legal Information System of Armenia (<https://www.arlis.am/en/>),
- Academic research institutions: the Armenian National Agrarian University (ANAU, <https://anau.am/en/>)
- International organizations in Armenia: United Nations Development Programme (UNDP-GCF Armenia's National Adaptation Plan project, <https://www.adaptation-undp.org/projects/naps-gcf-armenia>), Food and Agriculture Organization (FAO, <https://www.fao.org/armenia/en>), the World Bank (<http://www.worldbank.org/en/news/feature/2011/07/19/energy-reforms-in-armenia-on-the-way-to-energy-security>), European Commission (EC, [https://ec.europa.eu/neighbourhood-enlargement/neighbourhood/countries/armenia\\_en](https://ec.europa.eu/neighbourhood-enlargement/neighbourhood/countries/armenia_en))
- National NGOs: AWHHE ([www.awhhe.am](http://www.awhhe.am))
- National foundations: Center for Agribusiness and Rural Development (CARD, <https://card.am/en>)

# Armenia: a brief overview

## ADMINISTRATIVE DIVISIONS



Map prepared by  
Environmental Research and Management Center,  
American University of Armenia

Armenia (official name: Republic of Armenia, RA) is a country in the South Caucasus region. From cultural, religious and political points of view, it is considered a European country. From the north it is bordered with Georgia, from the east with Azerbaijan, from the south with Iran, and from the west with Turkey.

Armenia is a mountainous country: 76.5% of the territory is on the height of 1000 - 2.500 m above sea level. Mountain ranges occupy about 14 thousand km<sup>2</sup> territory or 47% of the country's total area. Plateaus comprise more than 1/3 (11 ths km<sup>2</sup>) of the country's surface.

The largest lake in the territory of Armenia is Lake Sevan (with surface of 1239 km<sup>2</sup>), this is the major source of fresh water for the Caucasus region.

Armenia is divided into ten provinces, with the city of Yerevan having special administrative status as the country's capital. Armenia's provinces: Aragatsotn, Ararat, Armavir, Gegharkunik, Kotayk, Lori, Shirak, Syunik, Tavush, Vahyots Dzor.

### Poverty in Armenia

According to the Statistical Committee of RA, poverty rate calculated with respect to the average poverty line in 2023 was 23.7%, with rural poverty reported at 27 per cent compared to urban poverty at 21.5 per cent<sup>1</sup>.

### **Agriculture sector**

The agriculture sector plays a very important role in the Armenian economy. Agriculture is one of the most important sectors in terms of economic development, employment, and livelihood. Sustainable agriculture means farming in sustainable ways with the purpose to protect the environment and natural resources, and maintain and improve soil fertility.

Sustainable agriculture practices offer numerous advantages, including:

- Preserving soil health: through crop rotations, cover cropping, and organic matter incorporation, soil health and long-term productivity are maintained.
- Promoting biodiversity: by supporting a diversity of crops and livestock, these practices maintain agrobiodiversity, strengthen ecosystems, and minimize risks from pests and diseases.
- Food security: by emphasizing long-term productivity over short-term yields, a secure food supply is guaranteed for future generations.
- Improving the livelihoods of farmers: sustainable methods reduce input costs and can lead to better farm-gate prices, thus improving farmers' economic vulnerability.
- Mitigating climate change: through carbon sequestration and reduced greenhouse gas emissions, sustainable farming helps to mitigate the impacts of climate change.

Sustainable farming practices include but not limited to:

- Crop rotation,
- Conservation tillage,
- Organic farming,
- Cover cropping,
- Soil management,
- Agroforestry,

---

<sup>1</sup> Statistical Committee, Armenia, Social Snapshot and Poverty in Armenia, Yerevan, 2024, [https://armstat.am/file/article/poverty\\_2024\\_en\\_00.pdf](https://armstat.am/file/article/poverty_2024_en_00.pdf)

- Integrated Pest Management,
- Permaculture,
- Sustainable intensified agriculture,
- Water management,
- Hydroponics and Aquaponics,
- Renewable energy integration, etc.

Armenian farmers have limited options to cultivate land sustainability because of land degradation and lack of access to input and supply markets. The agriculture sector is characterized by a large number of small-scale farms that have fragmented holdings. Over 89 percent of farmers cultivate farms smaller than three-hectare, though the average farm size varies across provinces. According to 2014 census data, there are 360 611 family farms<sup>2</sup>.

In Armenia, cultivated lands is subject to various degrees of erosion. Most of the agricultural machinery being used nowadays in villages is outdated, from Soviet-era times. There have been some international and national programmes over the last few years that have supplied some villages with new tractors; however, the effort has remained insufficient to meet the overall need for farming equipment. The shortage is particularly acute in ploughing and harvesting machines. Most farm families in the provinces cannot afford to purchase new farm machinery.

Therefore, land degradation, lack of cultivation means, insufficient irrigation, and related issues cause extensive areas of land to remain uncultivated or underutilized. Available information is fragmented. Although there is information about the implementation of some projects, but information about the operation of the established systems are not always available (as it is not foreseen in the existing data collection system and such information is not being collected).

Several sustainable agricultural practices that are implemented in Armenia are described here.

---

<sup>2</sup> FAO. 2020. Smallholders and family farms in Armenia. Country study report 2019. Budapest. <https://doi.org/10.4060/ca9823en>

# Sustainable Land Use Practices in Armenia

## 1. Soil and Crop Management Systems

Armenian agriculture is heavily influenced by Armenia's landscape. Armenia's landscape is a combination of mountain ranges, uplands, plateaus and valleys. There are 14 main soil types in Armenia<sup>3</sup>.

Global climate change, together with unsustainable land management, has significantly impacted the land resources in Armenia, leading to causing interconnected problems such as land degradation, soil erosion, pollution and landslide. For example, erosion that washes away necessary nutrients lowers soil productivity and results in sparse and thin vegetation cover. Similarly, land degradation lowers water filtration capacity, further worsening water erosion and increasing the risk of flooding – particularly on sloping hills of the nation's mountains areas.

There are various tillage systems used in agriculture, and each varies in the degree of soil disturbance. Tillage refers to the mechanical break-up and movement of soil using machines. The most prevalent practice in Armenia is conventional tillage, in which soils are tilled to various depths for tasks such as seedbed preparation, interrow cultivation, and pest or weed control. For example, ploughing will typically turn over 15 to 25 cm of soil, incorporating most of the crop residues. On the other hand, conservation agriculture (CA) or no-till practices minimize soil disturbance. In CA, soil is disturbed merely at planting, using special planters. CA promotes sustainable and profitable farming, aiming to improve farmers' welfare by utilizing three CA principles: minimum soil disturbance, permanent soil cover and crop rotation. In this case, weed control relies on herbicide application.

Minimum tillage practices result in more organic matter in the soil, improved water retention, reduced compaction of the soil, and lower pressure on soils, with no burning of the organic residues. E.g. no-till farming, a form of conservation tillage, does not disrupt or remove crop residues from the land. This maintains natural decomposition, improves soil fertility, and improves overall soil quality.

### Box 1. No-till system application in Armenia

In Armenia, the no-till system was first introduced in 2000 by the **Armenian Technology Group (ATG) Foundation**. Since that time, application of the no-till is growing slowly but there are no official statistics available on the use of soil-conserving and resource-saving practices in Armenia<sup>4</sup>. Saving fuel, labor, and equipment costs are most significant advantages of no-till farming. It is estimated, that with this system, 30 000 – 50 000 AMD per hectare of spending is saved compared to traditional sowing. Farmers pay more for sowing and cultivation separately

<sup>3</sup> Hunan Gh. Ghazaryan. Brief outline of soils In Armenia. <http://user.mendelu.cz/xvlcek1/rrc/edldir13/Ghazaryn.pdf>

<sup>4</sup> ATG. 2010. Activity report. <http://www.atgusa.org/>

compared to traditional methods, but new no-till machinery allows both operations to be performed at the same time using a special planter.

The first no-till farm machinery was imported to Armenia in 2011 by the ATG Foundation. Farmers began trying out the technology in 2010 and using it on about 100 ha.

Very good example is **“Bozoyan” LLC** which cultivated more than 2000 ha in Tashir Province in 2020 using CA techniques. Currently, he actively cultivates wheat on approximately 2,000 hectares of his 2,500-hectare agricultural land, thereby implementing a land rotation strategy.

In **Shirak Province**, zero tillage was implemented on 50 hectares of land in 2020, according to the Agribusiness Development Center in the province. As Shirak is a semi-arid province, for good yields in rainfed agriculture, it largely relies on having effective soil moisture. In such circumstances, no-till agriculture is of prime significance in minimizing the loss of soil moisture, hence promoting resilience and productivity.

Some experts think that placing the crop residue into the soil, as opposed to leaving it on the surface, will also minimize the possibility of plant diseases being carried forward, since residues can serve as hosts and infect future crops.

Overall, Armenian farmers have no knowledge of zero-till or no-till soil cultivation technology. Even when they are familiar with no-till, it is usually not possible for them, to acquire the specialized machinery required, i.e., planters. Since tillage can no longer be utilized for mechanical weed control, herbicide use becomes required.

In addition, no-till benefits are not instantaneous. Field under decades of tillage cannot achieve noticeable yield increases in one year, as the soil takes a while to regenerate and return to its natural state.

### **Crop rotation, intercropping, planting cover crops**

One of the simple farming techniques that were widely followed on in Soviet times was crop rotation – a managed cycle of cultivating crops of different botanical families, with fallow breaks in between, on a given land over time. This integrated approach diversifies production, allows the employment of crops better adapted to specific soil and climatic conditions, and promotes the use of resistant varieties. It incorporates proper management of soil and crops, improving soil fertility and plant health. The rotation between cereals (high in carbon) and legumes (high in nitrogen) means that the cropping pattern can provide sufficient nutrients. Legume crops, such as alfalfa and clover take nitrogen from the atmosphere and store it in their root nodules so that when the crops grow, the nitrogen becomes available to it and the soil becomes naturally enriched<sup>5</sup>. Crop rotation would assist in breaking the cycles of pest and also improve soil fertility

---

<sup>5</sup> Corsi, S. and Muminjanov, H. 2019. Conservation Agriculture: Training guide for extension agents and farmers in Eastern Europe and Central Asia. Rome, FAO.

and soil moisture. This practice is, however, not being practiced on a wide scale by farmers in Armenia. The most important constraints are: a) fragmentation of privatized land, b) scarcity of land and crop management machinery, etc. Alternatively, the majority of small landowners rely on intercropping as an alternative, hoping to diversify production, make more efficient use of every square meter of land, and gain relatively higher revenues.

Cover crops are planted during the off-season, not for a harvest but for improving soil health and the benefit of subsequent crops. Cover crops provide a variety of advantages, including averting erosion, enhancing physical and biological properties of the soil, contributing nutrients to the next crop, suppressing weed growth, reducing water loss, and disrupting pest life cycles<sup>6</sup>.

Some farmers are aware that the absence of crop rotation will ultimately lead to declining yield. Crop rotation accumulates soil organic matter and nutrients – especially – nitrogen while successive monocropping depletes the soil of the constituents needed to grow the same crop.

But the crop rotation is hindered by different factors. This includes limited knowledge, poor levels of education for agriculture, and small, scattered land holdings in villages that minimize the viability of incorporating rotation practices. Soil sample analysis for agrochemical content is not typically done in most cases.

## 2. Low External Input Sustainable Agriculture

Low External Input Sustainable Agriculture (LEISA) is not defined everywhere, but usually aims to make the most of the resources and natural processes and minimize reliance on external inputs. Traditionally, agricultural systems in Armenia are a mixed crop and livestock production. The most of the cultivated land is used to produce dryland cereals for household consumption needs as well as for the purpose of feeding livestock. Livestock help in maintaining soil fertility and utilizing plant residues that would otherwise be wasted.

The integration of livestock into farming increases various benefits: increased soil organic matter and fertility, farm product diversification, additional sources of income, enhanced resilience, and assistance in weed and pest management. It also reduces dependence on chemical fertilizers, fuels, and other costly inputs, while it enhances the farmers' income and food production.

The principal behind LEISA is that poorer rural households, lacking the funds to purchase expensive inputs, can still farm in a sustainable way by relying on local resources. In Armenia, however, LEISA and Integrated Pest Management (IPM) are faced with the same limitations for farmers to base their decisions on about how to select the most suitable practices for their situation.

Although little official data exist on LEISA in Armenia, it can be supposed that the majority of rural villages implement LEISA-like systems, as they are deeply incorporated into traditional farming.

---

<sup>6</sup> ibid

Nevertheless, some limitations exist: in villages not having the gas network, manure is used primarily for warming houses rather than fertilizing fields, lowering its potential for agricultural use. In addition, some manure before full decomposition, minimizing its effectiveness and causing harm to crop and soil health.

## **Agroforestry**

Agroforestry is land use system that integrates woody perennials such as trees and shrubs with agricultural crops and, in some cases, animal production. It creates multifunctional landscapes through the placement of trees within or around crops or pastureland, thus integrating components of both agriculture and forestry. It not only improves productivity on the farm but also assists in the protection of the environment.

Agroforestry is not widely spread in Armenia, and this is primarily because of dispersed and small land plots. This factor prevents mechanized agriculture and reduce the available area on the borders of field.

There are some serious barriers to the development of agroforestry in Armenia, including limited access to information and lack of cooperation between farmers. The lack of collective organization prevents farmers from achieving economies of scale, pooling resources, and adopting common approaches to improve access to inputs and markets.

## **3. Integrated Pest Management and Organic farming**

Integrated Pest Management (IPM) is an ecosystem approach to crop and pest management that combines a wide variety of methods to grow healthy crops with less pesticide use. It promotes the use of alternatives – e.g., crop rotation, mechanical cultivation, and biological control tactics – whenever possible. It relies heavily on farmers having knowledge of agroecological processes to enable them to make informed decisions in terms of most appropriate pest control measures at all stages of plant growth and throughout the entire production process<sup>7, 8</sup>.

As an environmentally friendly approach, IPM minimizes pest damage yields caused by pests, weeds, and rodents. Through improved protection of crops and reduced reliance on pesticides, IPM not only increases yields but also the environmental health.

Lowness in competitiveness, product quality, and agricultural productivity in Armenia is often caused by the poor utilization of technologies and a lack of awareness of effective farming practices like IPM. Knowledge and information are key to informed decision-making in pest

---

<sup>7</sup> АWHHE. 2020. Обзор ситуации по особо опасным пестицидам (ООП) и альтернативам в Армении.

<sup>8</sup> USAID-Armenia. 2019. Rural Economic Development – New Economic Opportunities Program: PERSUAP

management, because IPM relies on applying the appropriate techniques according to credible data.

In Armenia, most subsistence and small-scale commercial and non-commercial farmers do not follow systemic pest management interventions and they use limited IPM tools including biological, cultural and physical pest methods and apply IPM alternatives such as biological, cultural, or physical controls to only a limited degree. On the other hand, farmers engaged in pest management also face additional challenges like re-invasion of pests and latter's resistance to pesticides, rendering control more difficult and less effective with the passage of time.

Few Good Agricultural Practices (GAP) and preventive IPM practices have been adopted by certain Armenian farmers - largely greenhouse growers and a few orchards. These include pheromone, electrified light, and yellow sticky traps; pruning; cow manure and fertilizer application; crop rotation and intercropping; balanced nutrient and water management; sanitation and hygiene in the greenhouse; resistant varieties; use of hoes or tillers to control weeds; and crop residue destruction at the end of the season.

Orchard farmers also utilize other practices such as planting resistant varieties or rootstock, removing plant residues, sanitation of trunk and branches from old bark and application of whitewash, pruning (including sanitary pruning of infected branches), use of organic and synthetic fertilizers, and mowing for weed control. The aforementioned measures are generally incorporated with pesticide use in an overall IPM plan.

The crop farmers, on the other hand, adopt crop rotation or sequential cropping, planting treated certified seeds or resistant seedlings/tubers, weed management through the use of hoes or tillers, and post-harvest activities such as crop residue removal and deep tillage, which are all components of their IPM.

#### **Box 2. Promotion of IPM tecnics by AWHHE**

The “Rural Economic Development-New Economic Opportunities” program (RED-NEO) is being implemented by the CARD Foundation with the Armenian Women for Health and Healthy Environment NGO (AWHHE), AM Partners Consulting and Hicks, Burnham and Williams LLC in 2019-2025.

RED-NEO activities promoted inclusive, sustainable economic security and economic growth by supporting at least 265 businesses in at least 60 communities. The program accelerated the growth of small- and medium-sized enterprises (including farms and cooperatives) in the regions; facilitated market linkages between producers and buyers; and established networks to promote local economic development. It fostered the development of a competitive agriculture sector by improving the performance of rural businesses and cooperatives, and their ability to meet quality standards.

AWHHE conducted Pesticide Evaluation Report and Safe Use Action Plan (PERSUAP) update in 2019 and 2023. The PERSUAP is an analysis of crops that could be supported, pests of those

crops, an analysis of all possible pesticides registered in 2018 for import and use in Armenia and IPM techniques. Trainings for PERSUAP were conducted among 150 farmers.

“Women Leading Rural Entrepreneurship in Armenia (WoLeRE)” was a component of RED-NEO project, which aimed to strengthen gender focus of the project and increase the access of women agripreneurs by supporting them to improve knowledge in financing, market opportunities and promote policies and practices for them to establish and grow competitive businesses. Main beneficiaries of the WoLeRE component were women from the same target communities of the RED-NEO program, who have established businesses in agriculture or those who had plans or ideas to start their career as agripreneurs.

AWHHE was responsible for organizing trainings. The aim of the introductory training course was to equip women in rural areas with the essential knowledge and skills on entrepreneurship to increase their understanding and awareness of the process of initiating new business ideas or improve the established business in the agriculture sector. About 3200 women were trained in 2-day trainings.

The main purpose of the advance training was to help the existing women agripreneurs, who intended to establish an agribusiness and women employees in the agricultural sector to upgrade their knowledge and expertise which would bring to business growth, access to new markets and eventually boost their incomes. About 3149 women were trained on different agricultural approaches, including IPM.



Introductory training course on entrepreneurship in Meghri in 2022      Beekeeping training in Zangakatun in 2022

Unfortunately, data on the extent of IPM implementation at the provincial levels are scarce. There are only limited data that are mostly activities supported by NGOs or foreign entities.

Key findings are as follows:

- ✓ No pooled data available on IPM application;
- ✓ Low purchasing power of consumers and weak demand for IPM products;
- ✓ Lack of quality inputs;
- ✓ Absence of laboratories to propagate and supply with natural enemies of different pests;
- ✓ Complexity of approach and number of practices to implement and follow;
- ✓ Due to land fragmentation and small size, impossibility to implement large scale/massive pest control measures, etc.

Large-scale rodent or pest control is currently pursued by the Government only for extreme infestations, even though they infest in large numbers, or on the initiative of farmers.

### **Organic farming**

Prioritizing nature-based approaches over chemical inputs, organic farming is a systemic approach prioritizing soil health, diversity, and ecological balance. Organic agriculture development in Armenia started in the early 2000s. While there has been growth, the overall magnitude remains tiny. Currently, organic farming is approximated to cover about 2% of arable land in Armenia, though no precise statistics are known due to the fact that there are limited monitoring systems. Organic agriculture, with few percent, is multi-faceted in production and products. Organic farming in Armenia includes: beekeeping; wild plant harvesting; growing crops (grains, fruits, vegetables); organic processing: juices, nectars, concentrates, herbal teas, dried fruit, bread. This indicates that organic agriculture is not just the production of crops in a chemical-free environment but also the valorization of rich biodiversity and local tradition in Armenia<sup>9</sup>.

Up to 2020, there were approximately 58 businesses in Armenia certified as working in organic farming. However, the country has significant untapped potential for organic production, as it has favorable natural conditions and traditional farming methods are common<sup>10</sup>.

#### **Box 3. Application of organic farming and beekeeping in the village of Saralanj, Lori Province**

In Armenia, Lori Province, in the village of Saralanj, Elya Vardanyan turned her passion for nature into a successful and sustainable way of life. A beekeeper to produce honey, pollen, and honey wine, she decided to diversify her business by cultivating the Damask rose, which is globally famous for its fragrance, beauty, and symbolic meanings.

Between 2020 and 2021, Elya's family planted about 3,000 rose bushes on a 3,000-square-meter land alongside the apiary, using only organic farming methods. The soil is an organic-certified soil, and the roses are irrigated with water pumped from the lower part of the

<sup>9</sup> Capacity Development Strategy and Plan for the Organic Agriculture Sector in Armenia.

[https://www.entwicklung.at/fileadmin/user\\_upload/Dokumente/Publikationen/Downloads\\_Laender\\_DivBerichte/Armenien/Armenia\\_Organic\\_Capacity\\_final\\_EN.PDF](https://www.entwicklung.at/fileadmin/user_upload/Dokumente/Publikationen/Downloads_Laender_DivBerichte/Armenien/Armenia_Organic_Capacity_final_EN.PDF)

<sup>10</sup> Ministry of economy of the Republic of Armenia. <https://www.mineconomy.am/en/page/1334>

settlement. With the branch grinder, Elya started to process small branches from her garden and orchards into mulch. She applied this organic layer around her rose plants, which soon showed positive effects: water in the soil was retained longer, weeds were suppressed, and the soil continuously improved as the mulch decomposed. Most importantly, this process eliminated the need for chemicals and brought her agriculture into the climate-smart farm practice domain.

The village women participated in collecting rose petals, both with a successful harvest and more job opportunities for the villagers.

As a follow-up to this achievement, in 2023 Elya planted an additional 2,000 bushes in her farm. In an effort to reduce electricity costs, a solar photovoltaic panel has been installed to power the irrigation pump and an electric shepherd that repels animals from the rose farms. A 7-ton water tank and drip irrigation system supply water consistently, while mulching film keeps the ground well-watered and conserves resources.

From the rose petals, Elya produces all sorts of organic products, including wine, vodka, jam, juice, and tea leaves for drying, all packaged nicely. She now has a fully enclosed 5,000-square-meter rose farm with drip irrigation and produces up to 1,000 kg of petals per year, which are sold to tea and preserves firms. Due to her steady use of organic fertilizer, her products are clean, healthy, and competitive.

Her roses are healthier and more resilient today, producing more quality flowers that not only earn them higher prices from customers locally but also bring in tourists. Her produce not only brings in revenue for the family but also inspires other farmers, especially women, to adopt sustainable practices and use natural resources in a more efficient manner.

Elya's story illustrates how innovation, combined with sustainable agriculture has the power to introduce new opportunities to rural societies.

#### 4. On-farm Water Efficient Systems

According to the land balance of 2022, agricultural lands cover approximately 68.7%<sup>11</sup> of the area of Armenia, with 442.73 thousand ha being arable. However, only 155.89 thousand ha are irrigated<sup>12</sup> (Statistical Committee, 2023).

Irrigation is considered to be among the main challenges for the farming sector in Armenia. The issue is not only low access to the irrigation system but also its wasteful use. For the most part, the issue is not the shortage of water but inefficient distribution systems and the lack of new,

---

<sup>11</sup> Statistical Committee of the Republic of Armenia. (2023) *Statistical Yearbook of Armenia: General Description*. <https://www.armstat.am/file/doc/99541043.pdf>

<sup>12</sup> Statistical Committee of the Republic of Armenia. (2023) *Statistical Yearbook of Armenia: Agriculture*. <https://www.armstat.am/file/doc/99541043.pdf>

efficient technology. Water losses are huge—half the amount in some areas—during irrigation due to old technology, poor infrastructure, and ineffective management methods<sup>13</sup>.

Most irrigation practices in Armenia is surface irrigation. In this most common method, water is brought down by gravity over the land. Furrow or border irrigation is widely practiced under this system, where water flows into narrow strips or channels of land. Simple as it is, and not so expensive, the practice is inefficient due to the high-water losses, heavy labor input, and low productivity of water use.

Sprinkler irrigation systems imitate natural rain by pressurized pumping water through pipes and discharging it onto crops using spinning sprinkler heads. While more efficient than surface irrigation, the system is not used much in Armenia.

Drip irrigation is an efficient irrigation system. It supplies water to the root area of the plants directly by using pressurized pipes and drippers near every plant. The immediate root area only is wetted when water is supplied, so water use efficiency is significantly enhanced and evaporation or runoff loss reduced. These systems are, however, more expensive to install and maintain, so their application among Armenian farmers on a large scale is limited.

The Government of Armenia introduced subsidy programs to promote the use of drip irrigation. With the help of these loans, many farmers installed drip irrigation and anti-hail systems. In response to the challenges posed by COVID-19, the Government supported farmers by offering loans for drip irrigation at either zero interest or a reduced rate of 2–3%.

In Armenia, the three main types of irrigation in use are surface irrigation (mainly furrow), sprinkler irrigation, and drip irrigation.

Drip irrigation is primarily used for crops grown in greenhouses and is the most effective method of watering. In addition to supplying water, the system also allows for the fertilizer to be applied directly to the plants.

Although some information is accessible concerning the utilization and scope of contemporary irrigation systems in Armenia, a summary is lacking. It is unclear whether all installed systems are being utilized and properly maintained. One of the main hindrances to adopting the new technologies is their high price. Drip and sprinkler irrigation system installation is expensive for farmers in the provinces, and the majority of the systems have been installed with donor or project support.

### **Box 3. Orchards with drip irrigation in Kotayk Province**

Sepuh Arzumanyan and his family established their orchard in the Kotayk village. Sepuh established a 3.5-hectare raspberry orchard with 40,000 Zyugana and Juanji rootstocks in 2019.

---

<sup>13</sup> Summary of the main directions ensuring economic development in agricultural sector of the Republic of Armenia for 2020 – 2030. Available from [https://mineconomy.am/media/10033/Razmavarutyun\\_Hamarotagir\\_Angleren.pdf](https://mineconomy.am/media/10033/Razmavarutyun_Hamarotagir_Angleren.pdf)

Over the years, he employed effective disease-control measures, experimented, and applied innovative methods. The family also has a 7,000 m<sup>2</sup> plum orchard (Viktoria variety), established in 2016.

To further develop his agricultural activities, Sepuh opened "**Tasty Berry**" LLC, which, taking into account the lack of resources in Armenia, places greater emphasis on resource-conserving technologies such as drip irrigation.

Another case of drip irrigation usage in orchards is presented by **Armberry CJSC**<sup>14</sup>, which was founded in 2015 in the Zoravan village of Kotayk Province. Armberry has heavily invested in years of work and earned good reputation in the cultivation of berries. Armberry operates in the Zoravan village of the Kotayk Province and grows raspberries, blackberries, and less physalis in 8 hectares of land.

The company promotes the production of berries by a system of tunnels, whereby tunnel greenhouses are used in growing seedlings. Berries are produced through a drip irrigation system that supplies plants with an adequate amount of nutrients.



Drip irrigation system in the raspberry orchard in Kotayk village      Berries in the greenhouse in the Zoravan village

---

<sup>14</sup> [https://www.facebook.com/armberryCJSC/?locale=hy\\_AM](https://www.facebook.com/armberryCJSC/?locale=hy_AM)

# Renewable energy integration in agriculture

Renewables such as solar, wind, hydropower, and bioenergy can be brought into agri-food value chains to supply energy for a wide range of activities like irrigation, transport, processing, and storage, and cold chain and refrigeration. Through renewables, agriculture can be made more sustainable, promote rural development, improve energy access, and mitigate greenhouse gas emissions while decreasing dependence on fossil fuels. The transition to clean energy options enables agri-food systems to both decrease their carbon footprint and increase efficiency and livelihoods. In Armenia, mostly solar energy is used as an alternative.

## **Box 4. Renewable energy integration in agriculture in Solak**

In 2019-2020, AWHHE implemented two projects in Solak settlement, both of which included crucial aspects of sustainable development and community resilience.

The first one, “Encouraging young specialists to power the agri-food value chains and building sustainable business models” project, was implemented in collaboration with the University of Chile, Energy Center (CE-FCFM). Funded through the Sustainable Lifestyles and Education (SLE) programme of the One Planet Network. the project led to the creation of the Green Rangers of Armenia for Sustainable Lifestyles and Education (GRA-SLE), a youth organization that developed environmental education and sustainable lifestyle promotion among Armenian students.

The second project was “Tackling Water Management Challenges in Rural Armenia” funded by The New World Program (NWP), a partnership between The Coca-Cola Foundation and Global Water Challenge”.

As a result of these programs, major repairs were carried out to the village irrigation water pumping station, including the complete repair of the roof and floor, installation of new windows, door repairs, installation of a new electric panel, purchase and installation of a new pump, installation of a 16 kW photovoltaic solar power system, and other related works.

This is one of the techniques of sustainable farming, where alternate solar energy is used to power irrigation systems.



The **solar photovoltaic system installed on the roof of the renovated pumping station**



New pump installed in **the renovated pumping station**

### Lessons learnt

- ✓ IPM: Implementation is hampered by severe challenges, including mounting pest pressures (weeds, pests, and diseases) caused by climate change and pesticide resistance. Pest management is also aggravated by decreasing pesticide availability, shortage of qualified experts, poor knowledge transfer to practice, and poor communication between experts and farmers.
- ✓ Biological control practices: Small quantities of pheromone traps, parasitic and predatory insects, and other biological control organisms are imported by Armenia. Small market size, high price, transportation issues, and maintenance factors restrain their extensive use and limit protection from invasive species.

- ✓ Land fragmentation: Difficult to be farmed economically by machinery with small, scattered land holdings, result in the loss of land in field boundaries, and make irrigation development and management difficult. Fragmentation lowers productivity by restraining use of agricultural mechanization and labor effectiveness. It also encourages farmers to adopt intensive practices such as continuous cropping and monocultures, which lower soil quality, increase costs of production, and lower land productivity.
- ✓ Aging equipment and machinery shortages: Conventional farming practices, bad infrastructure, and a lack of modern machinery support low levels of productivity. Among the major bottlenecks to widening the dissemination of conservation agriculture (CA) is a lack of specialized machinery that is suitable for CA practices.
- ✓ Institutional capacity: Provincial departments of agriculture and environmental protection have a mandate to support regional programs, push socio-economic development plans, and analyze agricultural issues for submission to the Government. Their capacity remains weak and requires upgrading in technical expertise and training in sustainable agriculture.
- ✓ Farmer cooperation: Farmer cooperation is essential, but current cooperatives lack capacity and resources. They must be upgraded through training, machinery, and facilitation tools.
- ✓ Irrigation: Drip irrigation is efficient but yet too costly for the majority of farmers compared to surface irrigation.
- ✓ Extension services and knowledge gaps: Farmer-extension/advisory service partnership is lacking. Farmers are not informed on how to control pests, protect crops, implement IPM, CA, advanced irrigation systems, crop rotation, and other sustainable technologies, which limit their use of such approaches.

## Recommendations

- ✓ Develop and implement a combination of preventive, mechanical, agrotechnical, biological, and chemical methods.
- ✓ Promote the use of resistant varieties, diverse crop sequences, associations, and cultural practices that reduce pest pressure and strengthen natural prevention.
- ✓ Apply pest and disease forecasting tools where feasible.
- ✓ Encourage decisions on interventions on the basis of all the approaches available, productivity effect of short- and long-term duration, and environmental impact, with a goal towards minimizing use of pesticides and advancing integrated strategies.

- ✓ Organize training of farmers on GAPs, IPM tools and tactics, pest management planning, and no-till soil tillage.
- ✓ Establish demonstration plots and organize field tours to showcase conservation practices like crop rotation, cover crops, and agroforestry practices.
- ✓ Promote and introduce LEISA as a sustainable agriculture practice.
- ✓ Improve irrigation infrastructure and management, with greater utilization of water-saving practices such as drip and sprinkler irrigation.
- ✓ Provide financial support and loans to enable large-scale implementation of advanced irrigation technology.
- ✓ Improve farmer cooperation and stress the principle of collective benefit.
- ✓ Encourage labeling of produce produced under GAPs or green cultivation practices as "GAP" or "green products."
- ✓ Support government-led agroecological schemes in order to support sustainable agricultural development.
- ✓ Increase access to modern agricultural equipment and machinery.
- ✓ Develop tools and incentives for enhanced investment opportunities in agriculture.
- ✓ Facilitate land consolidation and enhance efficiency of land usage based on international best practices.